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Revitalization of Depressed Industrial Areas Based on Ecological Industrial Parks

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ABSTRACT

In the current trend of global industrial development, the creation of economic benefits is no longer the only goal of industrial development. Increasing attention is paid to the concept of compatible and continuous development of the economy, the environment and society, which determines the relevance of the study. The purpose of this study was to summarize the advanced international experience in the implementation of the depressed industrial areas revitalization concept, which allowed the authors to identify and justify the use of legal schemes necessary for the implementation of this concept based on the principle of "win-win". To analyze the existing problem, systematization and generalization methods were used as well as methods of expert assessment, classification and structuring of information, reference and statistical data. As shown by the results of the study, the idea of a polycentric city can be realized through the depressed industrial areas revitalization. A comparative description of Russian eco-industrial parks projects has been compiled. The authors of the article emphasize that at present there is an urgent need to develop economic instruments to speed up the reorganization of production areas with state support at the level of federal and regional authorities.

Keywords: revitalization of territories, the industrial Park, a depressed industrial area

INTRODUCTION

Issues of industrial areas revitalization in the cities of Russia are undoubtedly relevant. Each industrial city is unique in its own way, but the town planning policy of the state brings common features to these cities, embodied in the look and architectural-planning content. Creation of separate complexes of ready-made modular premises has been practiced for a long time in industrial parks of the world [1].

During the conservation of industrial facilities and in the process of revitalizing production areas, all fundamental architectural principles must be maintained, as a result of which the objects acquire historical value and become objects of architectural heritage [2]. It is not excluded that any unique production capable of being an interesting object of industrial tourism may become a symbol of the city or part of its image.

METHODOLOGICAL FRAMEWORK

In order to study the directions of improving project management it is on the revitalization of urban areas on the basis of the creation of industrial parks used methods of factor and structural and functional analysis, integrated

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analysis, expert evaluation, classification and structuring of information, reference and statistical data, the method of comparison and others.

RESULTS AND DISCUSSION

Directions of State Policy on the Revitalization of Depressed Industrial Areas

The basis of urban policy in many countries is to provide a comfortable habitat for residents of the city: places of employment and rest [3]. The construction of industrial parks, technoparks, technopolises, and business incubators is impossible to solve [4]. As the results of the article authors' study have shown, the work of a polycentric city can be realized through the revitalization of depressed industrial areas. In particular, the main directions of such a policy should be:

- providing timing and development programs, the development of a specific program of reorganization and development of industrial areas. This requires development of a comprehensive strategy of the output, and a new placement of urban functions and the creation of legislative systems for its implementation;
- forming urban policy "balanced development", the aim of which should be the formation of a harmonious living environment of residents of the city: places of application of labor, recreation, accommodation. New territories should attract young people with innovative knowledge;
- saving important productions to city. For the harmonious development of the metropolis it is not possible to take into account the opinion of each landholder. World experience shows that investors are not attracted to development projects with a payback period of more than 5 years; commercialization of leading scientific developments requires 10 years or more.
- need in enhancing energy efficiency of production. At the investment stage, new construction is cheaper, and energy-efficient, environmentally friendly technologies should become mandatory.

Generalization of international best practices by implementing the concept of depressed industrial areas revitalization allowed the authors to identify and substantiate the article expedience use of legal schemes necessary for the implementation of this concept, based on the principle of «win-win», namely:

- creation of specialized closed real estate mutual funds (The Council of Europe participants in the process are arranged in a certain area calculated by the public interest of the city);
- investment partnership scheme (realized by the draft law, along with mutual funds, effective in areas with a large number of owners);
- a scheme for concluding an agreement on the integrated implementation of planning projects. (Slander owners with land rights, on their plans for conversion, distributing finances, deadlines for execution and functional purpose of objects).

In addition, in a number of countries, special economic regimes are being created for industrial zones, innovative territories and industrial parks, and at the same time, compensation for the costs of conversion and relocation, remuneration for the active activities of economic entities continues (5). At the same time, we have the experience of introducing sanctions to residents of industrial areas, not leading to innovative and industrial activities.

Ecological Industrial Parks, as a Promising Direction for the Revitalization of Territories

A special form of industrial ecosystems has been implemented in ecological industrial parks. Conditions for more efficient (economically and environmentally) organization of the region's life activity appear in them [6]. The approach is the same as in organizing territorial production complexes, but with closer and more targeted connections between enterprises and in a smaller area [7, 8]. The United States Environmental Protection Agency (EPA) gives the following definition: Ecological industrial park is a territorial integration of producers of goods and services who wish to improve their economic and ecological state through the joint management of natural resources (energy, water and materials) and the environment [9]. Working together, manufacturers hope to get a synergistic effect more than they would have separately.

The main task of ecological industrial parks is to improve the economic condition of the participating producers and reduce environmental pollution [10]. This approach includes planning (or re-planning) of the park's infrastructure, prevention of environmental pollution, increasing the efficiency of using raw materials and energy resources, and partnership between producers of goods and services. Through mutual cooperation, these enterprises become an industrial ecosystem.

The projects of eco-industrial parks in European industrial countries are presented in **Table 1**.

Table 1. Projects of eco-industrial parks in European industrial countries

No	Name, Location	Specifications
1	Kalundborg, Denmark	Initially, the main idea of creating a cluster was to reduce costs and benefit from the sale of by-products, and enterprises managed to achieve this. Currently, 16 parties are involved in the Kalundborg partnership, including farmers and the local municipality. A highly developed industrial symbiosis, characterized by a network of inter-company material exchanges and energy cascades, has been developed over the past 25 years without any outside influence.
2	Rotterdam Harbor Industrial Ecology Project (ENIS), Netherlands	The project on the study of the potential of creating by -products exchange among 60 companies; training for participating companies
3	Ecopark Moerdijk, Netherlands	Conversion of the existing production site - decontamination(disinfection) of contaminated soil
4	Recycling Network Styria, Austria	Highly developed processing network, including power plants, building materials industry, paper and plastic production and others
5	Eco-Industrial Park Karlsruhe, Germany	Virtual eco-industrial park; about 40-50 companies; organic and mineral by-products exchange network, information and communication networks; dematerialization chains
6	Verwertungssystem Ruhrgebiet, Germany	Strongly evolved recycling network; processing plant, power plant, building material manufacturing companies and various other campaigns exchanging offal, steam and energy
7	Bioenergie und rohstoffzentrum Dormagen, Germany	Virtual eco-industrial park; the exchange of by-products and energy cascades, an information and research organization; enhanced collaboration between companies, universities and government organizations.

Table 2. Perspective international projects of eco-industrial parks in developing and new industrialized countries

No	Title	A country	Specifications
1	Kocaeli, Istanbul, Marmara region	Turkey	- recycling, reuse, industrial symbiosis; - innovative technologies in order to increase environmental performance; - cooperation, including production processes and complementarity; - advantages of location: they are located on the axis of Istanbul-Ankara; - transport advantages: the presence of TEM and D-100 autobahn, Izmit airport, proximity to Kurtkoy airport, proximity to ports such as Derinceand Diliskilese; - the presence of large industrial aggregations in the region, such as Hondaand Isuzu, enterprises in the Anatolian part of Istanbul and other enterprises in Sakarya.
2	OSTIM (OSTIM Industrial Region)	Turkey	OSTIM (OSTIM Industrial Region) is one of the largest industrial parks in Turkey is meant exclusively for small and medium-sized businesses, which implemented the concept of a "commercial city". Today, the OSTIM industrial park is 5,000,000 sq.m., On the territory of which 5,000 small and medium-sized businesses operate, with a production of 52,000 people.
3	Bursa Organized Industrial Zone	Turkey	Today, "Il Bursa" is the most industrialized region of Turkey, on whose territory the largest production facilities of both Turkish and foreign companies are located. The organized industrial zone "Bursa" was founded in 1962 and today occupies a territory of 700 hectares.
4	"Eskisehir" (Eskisehir Chamber of Industry Organized industrial zone).	Turkey	The initiators of the industrial park were industrial enterprises represented by the Chamber of Commerce in the Eskisehir region. On the territory there is a plant for the production of ceramic tiles of the company Kilicoglu, which is the largest Turkish manufacturer of these products. The organized industrial zone "Eskisehir" is the largest industrial park in Turkey, with a total area of 3200 hectares. The construction of the industrial park began in 1968, and in 1974 the production of the first resident was launched.

One of the first and most famous examples of industrial symbiosis is the ecological industrial park in the Danish Kalundborg (75 miles east of Copenhagen). The history of a small industrial zone began in 1959 with the construction of the power plant of the Danish company Asnaes, which was later joined by the Statoil oil refinery, the shop of the pharmaceutical company Novo Nordisk and Gyproc is one of the largest producers of drywall in Scandinavia [11, 12]. In the 1980s, mutually beneficial production began to develop here for the first time: local authorities built a network that distributes water, electricity and thermal energy from industrial waste to 20 thousand people. Later joined local farmers who plant Novo Nordisk began to supply biological sludge as a fertilizer (now the volume of these supplies reaches 1.5 million cubic meters per year) (**Table 2**).

Russian Experience in Creating Industrial Parks

At present, over 300 projects for the creation of industrial parks are being implemented in Russia. However, according to the Association of Industrial Parks of Russia, only 41 projects of them actually function and there is not a single one that fully complies with the standard of foreign industrial parks in the Western sense [13].

Table 3. Projects of industrial parks in Russia

Name, Location	Specifications
Master plan, modernization of the urban infrastructure of Vladivostok "	Master plan assumes such strategic transformation as the modernization of the central streets of the city and the coastal zone of Vladivostok, the creation of new industrial zones and business services with-centers and the development of public transport networks and creating opportunities for development of tourism and innovative industries. An innovative project involves the modernization and arrangement of areas adjacent to the city's railway stations, the creation of tourist facilities, and the introduction of a system of automatic control of traffic lights based on data on the number of cars on the roads (Japan will present the Russian plan of modernization of infrastructure of Vladivostok [19]
Renovation project the island of New Holland in St. Petersburg.	New Holland will be a triangular shaped island St. Petersburg on its own supports with various cultural institutions placed in an area of 7.6 acres. The project includes conference halls, galleries, a theater room, a hotel, restaurants with a mobile arena, shops and apartments [20].
Museum of Water in the territory of the enterprise "Vodokanal" in St. Petersburg	The reconstruction of an industrial facility - the water tower building - is the first in St. Petersburg experience of reviving old industrial buildings that have lost their former purpose and experiment on mixing the styles of the 19th and 21st centuries. The main task was to restore, purify from the later "layers" and adapt the interior of the tower to the new functions. Preserving the integrity of the interiors - beautiful rooms with arched ceilings. Requirements for the preservation of the historic interiors of the Tower led to the removal of the elevator and stairs to a separate extension. It was she who became the main focus of reconstruction. In its forms and material can be read the image of water. Together with the tower, the territory around the museum was successfully transformed. Broken square, arranged a fountain, put the sculpture.
The project "Golden Island" Moscow	"The program" Golden Island "covers the territory of the island opposite the Kremlin from the Bolshoy Moskvoretsky Bridge to the monument to Peter the Great on Strelka Island and for the first time creates conditions for the integrated development of the territory of the historical center with an area of more than 40 hectares. The buildings of the Krasny Oktyabr factory, which are monuments of industrial architecture, are planned to be reconstructed; it is planned to accommodate various public functions and individual "lofts" - places of residence and work of artists, sculptors and representatives of other creative professions. At the site of the demolished buildings of the factory, which do not represent architectural value, it is planned to build an elite residential complex. On the western part of Strelka Island, in a place surrounded by water on three sides and remote from the city's main roads, there will be a hotel, cafes and restaurants. Two-storey underground parking area of about 50 thousand square meters. It will be located under the bottom of the hydraulic engineering structure of the Drainage Canal between the monument to Peter I and the Small Stone Bridge. The underground parking space will be connected to the underground part of the "Megapolis Center" complex on the Strelka Island" "[21].
The project of reorganization of the industrial zone "Kolomenskoye" in the Southern District, Moscow	According to the project of reorganization of the Kolomenskoye industrial zone in the Southern District, a multifunctional hotel complex will be built on a plot of 3.5 hectares in which shops, restaurants and cafes will be opened. Visitors and employees of the complex will be provided with parking for 550 cars, 80 of them will be equipped at the underground level, and a separate eight-story parking will be erected for the rest. As a result of the reorganization of the industrial zone, 670 new jobs will appear. The plans also significantly improve the transport service area. For this, the roadway of Starokashirskoye Highway will be reconstructed: it will be expanded to three lanes, a transitional speed lane in front of the Kashirsky exit to Starokashirskoye Highway, a parking area for buses will be organized. In order to preserve the ecological balance in the region, they will carry out a number of measures for the improvement and gardening. Including a new natural complex will be created along the Zhuzha River with an area of 1.61 hectares [22].

Table 3 gives a brief characterization of the individual projects and the creation of industrial parks on the territory of the Russian Federation [14–18].

According to experts, in the Russian context the prefix "eco" in the word "eco-technology park" can be taken quite seriously only in one case, if the Government of the Russian Federation: develops, approves and obliges the subjects of the Russian Federation to fulfill the year-by-year targets for separate collection and utilization of certain types waste; will cancel the target for disposal: nothing is harmful if you approach the problem wisely; will prohibit the disposal of compostable waste; replenish the list of goods subject to mandatory disposal, tetrapacks and other multilayer packaging; prohibits the use of foamed polystyrene (VPS) and polyvinyl chloride (PVC) in the manufacture of packaging and packaging, as well as packaging labeled 7, because no one knows what mixture of polymers it is made of.

CONCLUSION

Currently, there is an urgent need to develop economic tools to speed up the reorganization of production areas with the help of the Moscow administration and leading institutions. In addition, it is necessary to strengthen the

city center for public-private partnership, which is engaged in attracting private investment, exploring express business projects on proposals for the rehabilitation of production areas.

Thus, an assessment of the socio-economic significance and analysis of the current development of industrial parks in Russia and abroad showed that the projects of such parks have a large territorial potential and positive infrastructural impact on the development of the region in which the industrial park development project is being implemented, in particular improving the quality of life of the population of the region, stimulating entrepreneurial activities in the region, increasing the investment attractiveness of the territory for the business and the formation of its industry sector.

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